U.S. Environmental Protection Agency

Response to 2005 Hurricanes

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Summary Results of Sediment Sampling Cond by the Environmental Protection Agency in res to Hurricanes Katrina and Rita

EXHIBIT 25

August 17, 2006

Overview

After Hurricane Katrina came ashore on the Louisiana Gulf Coast, the Environmental Pro (EPA) and its Federal and State partners conducted a comprehensive investigation to cha potential environmental effects to the parishes that were flooded by up to 10 feet of water Pontchartrain and the Mississippi River/Gulf of Mexico outlet. Since early September 200 collected approximately 1,800 sediment and soil samples in Jefferson, Orleans, Plaquem Bernard Parishes in four discrete phases. Most of these samples were analyzed for over organic chemicals.

As each phase of sampling was completed, the results were compared to conservative he screening levels for residential exposure developed by EPA and Louisiana Department of Quality (LDEQ). Summaries and general assessments of the data were developed by EP with input from the Centers for Disease Control (CDC), the Agency for Toxic Substances Registry (ATSDR), the Louisiana Department of Health and Hospitals (LDHH), and the Fe Emergency Management Agency (FEMA). Detailed information.

The sample results indicate that, in general, the sediments left behind by the flooding fron are not expected to cause adverse health impacts to individuals returning to New Orleans areas were re-assessed due to elevated levels of arsenic, lead, benzo(a)pyrene, and dies organic petroleum chemicals. The results of these re-assessments indicated that: 1) the h concentrations of arsenic were likely associated with herbicides used at or near golf cours pyrene was found in a small section of the Agriculture Street Landfill Superfund site and v as the Housing Authority of New Orleans finalizes its plans for badly damaged townhome the concentrations of diesel and oil range organic chemicals are diminishing and will be m time to ensure that these concentrations continue to decrease; and, 4) the elevated levels detected in samples collected by EPA predate the hurricanes. The lead results from the E comparable to the historical concentrations of lead in soil in New Orleans found in studies local university researchers before the hurricanes.

The extensive sediment and soil sampling in response to Hurricane Katrina is complete. E have collected approximately 1,800 sediment and soil samples. This work, completed in f provides an extensive picture of the conditions in the flood impacted areas, and serves as series of recommendations and advisories provided by local government.

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Phased Sampling And Results

The objectives and results of the sediment sampling are the focus of this summary. EPA I several other Federal and State environmental and health agencies, carried out this missi by collecting approximately 1,800 sediment and soil samples in four phases.

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Phase I – Sediment from floodwater

Sediment sampling in Phase I began on September 10 and was completed on October 1⁴ Approximately 450 individual samples were collected throughout the flood-impacted areas samples were analyzed for over 200 organic chemicals (including gasoline, diesel fuel, ar and coliform bacteria. The data from these analyses were used to assess: 1) whether haz substances were present in the sediment in residential areas; and, 2) the potential health emergency workers and residents from short-term exposure to any hazardous substances sediment.

The results of the Phase I sampling indicated that hazardous substances were not detect sediments at levels that would pose an immediate health risk to workers involved in respo to residents returning for a quick assessment of damage to their homes. The highest leve were found in samples taken from golf courses, which were likely from the use of herbicid arsenic. Lead was found in approximately 5% of the Phase I samples in concentrations c historical concentrations of lead in New Orleans.

The results from the Phase I samples were compared to both LDEQ Risk Evaluation/Corr Program (RECAP) and EPA's risk criteria based on long-term (30 years) residential expos assumptions. The majority of chemicals detected were below levels of health concern. Ho were some localized areas with levels of arsenic, polycyclic aromatic hydrocarbons (PAHs and oil range organics that exceeded LDEQ and EPA criteria. LDEQ and EPA revisited a previously sampled locations. For re-sampling to occur, the sediment depth had to exceed cm (0.5"). Sediments of sufficient depth were found at 14 locations, and were re-sampled conditions at that time. The results from the samples at these 14 locations are included in found at the Internet site listed below.

More details on Phases I and II

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Phase II – Sediment from floodwater

The second phase of sediment sampling began on October 29, 2005, focusing on the Lov of New Orleans and St. Bernard Parish, the areas most severely impacted by the floodinc of this phase of sampling was to define areas of concern (e.g., areas with chemical conce may be associated with a greater than 1 in 10,000 excess lifetime cancer risk) larger than

Approximately 280 individual samples were collected between October 29 and Novembe
analyzed for the full suite of over 200 organic chemicals, metals, gasoline, oil, diesel fuel
constituents. Lead was the only analyte detected above screening levels in any samples
Phase II. Lead was found in four locations in St. Bernard Parish above the EPA and LDE
value of 400 mg/kg.; EPA and LDEQ used the 400 mg/kg lead level as an indicator that fu
may be appropriate in specific areas around the city.

On December 9, 2005, LDEQ, EPA, and their State and Federal partners, released a sum
environmental assessment for the areas impacted by Hurricanes Katrina and Rita based
collected in the Phase I and II sediment sampling events. A general characterization of th
and identification of areas to focus any further evaluation were included in the summary. I
assessment, LDEQ and EPA also noted that a more detailed assessment would be neces
locations in the flood-impacted area based on the analytical results of the samples collect
and II.

More details on Phases I and II

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Phase III – Focused sampling of flood impacted soil and sediment

Based on the results of the Phase I and II sampling, which found elevated concentrations
or benzo(a)pyrene in flood-impacted residential areas, EPA and LDEQ identified 43 speci
further investigation. The goal of the Phase III investigation was to determine whether the
of arsenic, lead and benzo(a)pyrene were isolated to the specific location that had been s
whether they were representative of a larger area. Additionally, pesticide analyses were c
samples collected at the former Thompson-Hayward pesticide blending facility at the requ
living near the abandoned facility.

Unlike previous sampling rounds, Phase III samples were collected and mixed together (i
samples) to characterize the average concentration of chemicals around the original sam
These composite samples were not only of the sediment deposited by floodwaters, but al
samples of the underlying soil that existed prior to the hurricanes.

The results from these composite samples indicate that: 1) the sediment left behind by th
contain arsenic at levels that would result in non-cancer impacts or exceed EPA's 1 in 10,
lifetime cancer risk; 2) a very localized area of benzo(a)pyrene contamination is present i
corner of the Agriculture Street Landfill Superfund site; and, 3) lead was found in soil sam
locations in excess of the EPA and LDEQ screening level of 400 mg/kg.

Lead concentrations exceeded the EPA and LDEQ soil screening level for lead (400 mg/k
composite samples collected in the areas where lead was previously detected in the sam
Phase I and Phase II. Lead concentrations in "soil only" samples and "soil mixed with sed
collected in Orleans Parish ranged from below the 400 mg/kg screening level to 3,960 mg
lead levels were detected in soil samples and not in the sediment deposited from floodwa

Elevated lead levels in soil are common in older cities throughout the United States. EPA'
Distribution of Soil Lead in the Nation's Housing Stock, estimated that 23 percent of
homes in the US built before 1980 had soil-lead levels above 400 mg/kg, and that 3 perce
exceeding 5,000 mg/kg. In New Orleans, researchers from Xavier University reported soil
high as 4298 mg/kg prior to Hurricane Katrina (**PAH and Metals Mixtures in New Orlear
Sediment**, The Science of the Total Environment, Mielke et al., 2001). The concentration
by EPA are consistent with the results from the Xavier University study.

The geographic pattern of sample locations that exceeded the soil screening level for lea

appears to correspond to older housing (built before 1978) that can contain interior and e
based paint. To further characterize the locations that exceeded the soil screening level o
samples from these locations were evaluated to identify the potential sources of lead cont
as lead-based paint, through a chemical speciation process. The results of the speciation
that the primary source of lead in the soil samples collected by EPA is lead-based paint, f
anthropogenic sources which include solder, leaded glass and pesticides, as well as from
deposition of lead from leaded gasoline emissions.

More details on Phase III sampling

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Phase IV – Sampling of Residual Sediment in flood impacted areas

Also in February 2006, EPA began a fourth phase of sampling, focusing on heavily impac
areas in Orleans and St. Bernard parishes. EPA used the results of this investigation for t
First, EPA has generated a map indicating where sediment remains and where sediment
Second, EPA updated the sediment database with recent analytical results. This samplin
completed on June 30, 2006. EPA visited 1,676 locations set up on a 200 foot grid in the
the flooded area and collected samples from 586 of these locations. Duplicate samples w
126 of these locations, resulting in 712 samples sent for analysis. Samples were not colle
1,090 grid points for one of three reasons: 1) the grid point was in a commercial area, 2) t
was less than 0.5 cm thick; or, 3) sediment was not found.

The results from the sediment samples collected in Phase IV are consistent with the resu
samples collected in the previous phases of sampling. The sediments remaining in the flo
areas are not expected to cause adverse health impacts provided people use good perso
practices. Arsenic, lead, and benzo(a)pyrene were each detected in only one sample in c
exceeding the EPA excess lifetime cancer risk range of 1 in 1,000,000 to 1 in 10,000 for a
benzo(a)pyrene and the 400 mg/kg soil screening level for lead.

More details on Phase IV sampling

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Diesel and Oil Range Organic Hydrocarbons

Diesel and oil range organic hydrocarbons concentrations are expected to decrease over
combination of natural degradation and sediment displacement or removal. Petroleum ch
associated with oil and diesel fuel were found in concentrations above the Louisiana REC
approximately 150 samples collected during all the phases of sediment sampling, excludi
Oil spill. EPA has compared the concentrations of oil and diesel range organic chemicals
collected in September 2005 with the concentrations of the same chemicals found in sam
the same location in November 2005. EPA conducted a similar analysis of co-located sam
in February, March and June 2006. The results of this analysis indicate that the concentra
chemicals are decreasing over time through a combination of factors including natural deg
processes and sediment displacement or removal at all but one location (See Table of Co
Trends). Future sampling will be conducted to ensure that the concentrations of petroleum
continue to decrease over time.

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Conclusions And Recommendations

The extensive sampling in response to Hurricane Katrina is complete. EPA and LDEQ ha approximately 1,800 sediment and sediment/soil samples since the hurricane flooded Ne the surrounding parishes. This work, completed in four phases, provides an extensive pic conditions in the flood impacted areas, and serves as the basis for the series of recomme advisories provided by local government outlined in this section.

EPA has contacted the property owners/managers, the Housing Authority of New Orleans regarding the benzo(a)pyrene results from EPA's sampling. The townhomes located in th of the site were heavily damaged by flooding and wind. EPA will work with HANO to ensu plans to address the damaged properties will also address contamination found by the EP EPA will provide a closeout report when HANO announces specific plans for the area.

The New Orleans Health Department and the State of Louisiana have provided general g precautions for returning residents regarding the diesel and oil range organic chemicals d include:

- Till sediment into existing soil;
- Re-establish and maintain grass and flower beds;
- Remove sediment from driveways and walkways to help minimize wind-blown dust
- Minimize dirt and dust inside homes.

EPA believes the best course of action for diesel and oil range organics is to allow the rec from the Health Department and the State of Louisiana to work. EPA will resample 10% o where diesel and/or oil range organics concentrations exceeded the Louisiana RECAP va months to confirm that the concentrations continue to decrease as expected. EPA will cor Louisiana RECAP values to compare the results from future samples.

Because of the historical problems with lead-based paint and elevated lead levels in soil, and local government agencies have recommended for years that all children under the a living in New Orleans should be tested for lead. In 2000, 14 percent of the children tested had elevated blood lead levels of greater than 10 micrograms of lead per deciliter of blood Childhood Lead Poisoning Prevention Program and the New Orleans Health Department information on how families can decrease the risk of lead exposure and where to get a blo NOHD also received a grant from the U.S. Conference of Mayors to develop a Lead-Safe New Orleans Lead-Safe House was the first of its kind in the U.S. and is used to tempora families while their homes undergo lead abatement. The following are recommendations f federal Lead Poisoning Prevention Programs have developed to help parents protect thei exposure to lead in the home and in their neighborhoods.

In the home:

- Keep children away from peeling paint inside the home.
- When cleaning up around homes in affected neighborhoods, shower and change c finishing work and before playing with your children.
- Place washable doormats or rugs at all entries of your home. Have everyone wipe leave their shoes at the door to ensure lead-containing dust will not be tracked into
- Wash doormats, rugs, cleaning rags, and work clothes separately from other family
- Frequently wash a child's hands, especially after playing outside, before they eat, a
- Do not let children put dirty hands, toys or other items that might have dust on ther mouths.
- When cleaning the home, wet-mop floors and damp-wipe surfaces.

Outside the home:

- Keep children from playing in bare dirt. Cover bare dirt with grass, bushes, or 4-6 i free wood chips, mulch, soil, or sand.

- Keep young children away from areas, such as old fences or houses, where paint i chipping, chalking, cracking or damaged.

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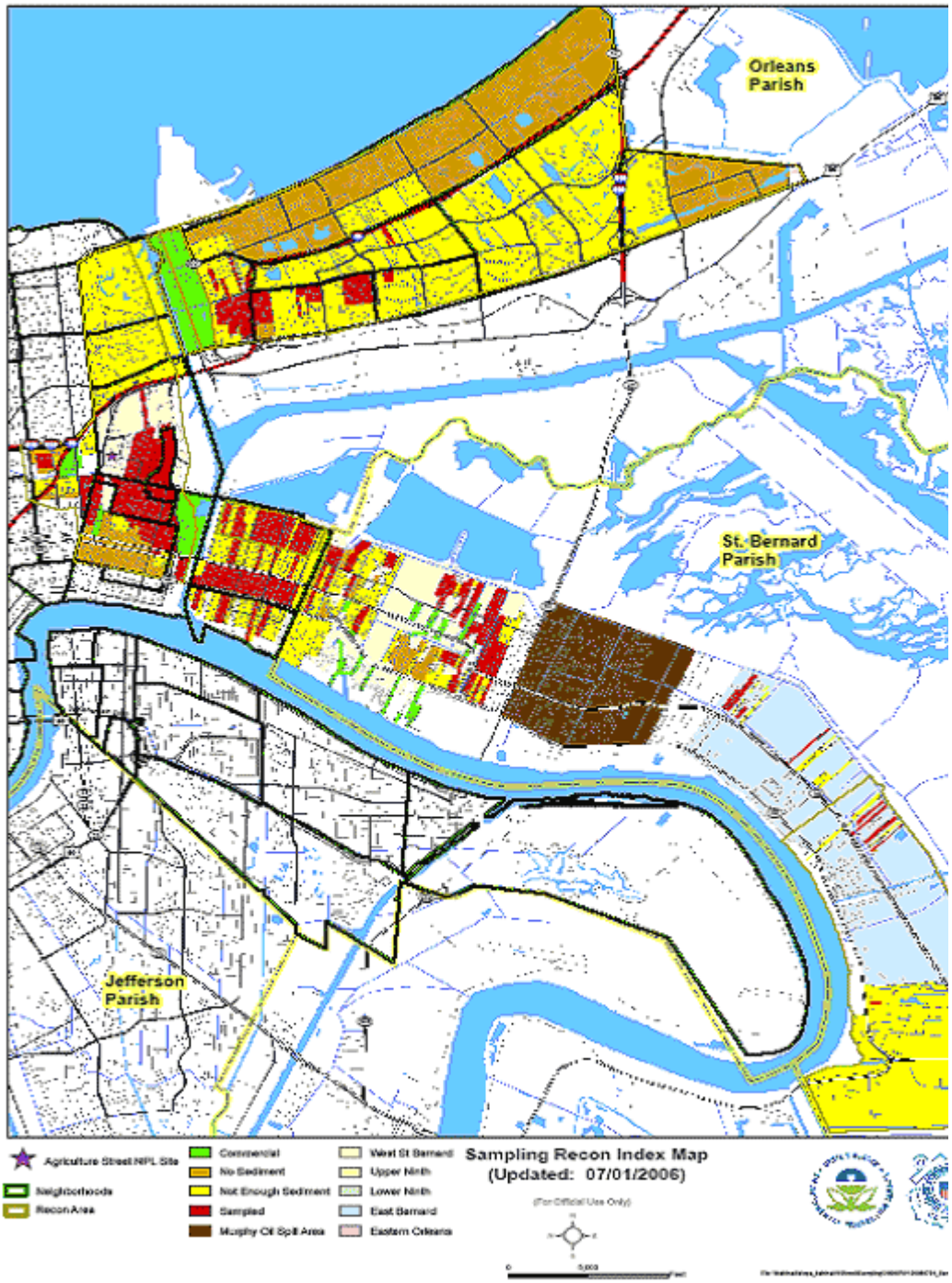
Sediment Sampling Map



Download PDF of Sediment Sampling Map (1 pp, 742 KB, About PDF)

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Hurricane Katrina Diesel Range Organics/Oil Range Organi Concentration Trends

The data presented in the table below are taken from samples collected at the same loca September and November 2005. Data from samples collected at three locations in Febru June 2006 was also reviewed. Overall, the data indicate that Diesel Range Organic and O Organic compounds are decreasing due to a combination of processes including natural d sediment displacement or removal. (The last pair of data points is an exception. Those da increase from February to June).

SAMPLE ID	SAMPLE DATE	DRO (mg/kg) (650 mg/kg)	% DRO DECREASE	ORO (mg/kg) (1,800 mg/kg)	
RS-155-SO-G-N-091405	9/10/2005	910		1450	
TO456-051119-02-RS01-N	11/19/2005	82.5	91	145	
RS152-SO-G-N-091405	9/14/2005	1890		*	
TO456-051119-04-RS01-N	11/19/2005	115	94	*	
RS908-DB-G-N-092505	9/25/2005	1010		2310	
TO456-051119-03-RS01-N	11/19/2005	49	95	111	
SS307-TS-G-N-092605	9/26/2005	793		1200	
T0456-051119-06-RS01-N	11/19/2005	632	20	335	
RS536-TD-G-N-091905	9/19/2005	799		1430	
TO456-051119-02-RS01-N	11/19/2005	130	84	782	
RS453-SO-G-N-091405	9/14/2005	3250		5540	
T0456-051119-01-RS01-N	11/19/2005	127	96	400	
RS405-AD-G-N-091405	9/14/2005	887		*	
TO442-051119-02-RS01-N	11/19/2005	48.5	95	*	
RS531-TD-G-N-091805	9/18/2005	742		1120	
TO442-051119-01-RS01-N	11/19/2005	203	73	113	
TO442-050927-09-RS01-N	9/27/2005	884		1640	
TO442-051120-01-					

RS01-N	11/20/2005	23.5	97	52.2	
RS510-TD-G-N-091605	9/16/2005	1000		2110	
TO297-051120-01-RS01-N	11/20/2005	447	55	1030	
TO232-050930-10-RS01-N	9/30/2005	1230		2170	
TD456-051112-02-SD01-N	11/12/2005	107	83	346	
RS062-TD-G-N-091205	9/12/2005	748		1870	
TO335-051110-08-SD01-N	11/10/2005	123	84	212	
RS404-KK-G-N-092605	9/26/2005	2690		6560	
TO297-051119-01-RS01-N	11/19/2005	62.1	98	132	
RS401-KK-G-N-092505	9/25/2005	779		2260	
TO335-051110-01-SD01-N	11/10/2006	55.5	93	67.1	
T1235-060212-05-RS01-N	2/12/2006	1700		3550	
T1332-060606-02-RS01-N	6/6/2006	138	92	538	
T1168-060311-01-RS01-N	3/11/2006	1290		4530	
T1332-060606-03-RS01-N	6/6/06	108	92	478	
T1168-060311-02-RS01-N	3/11/2006	4060		14000	
T1332-060606-04-RS01-N	6/6/2006	138	96	538	
T1235-060222-05-RS01-N**	2/22/2006	1360		3060	
T1332-060606-01-RS01-N**	6/6/2006	1410		3230	

* ORO concentrations were below LDEQ's RECAP Management Option -1 cleanup stan
mg/kg in both samples collected at that location.
** EPA believes that the DRO and ORO concentrations have not decreased at this locatic
presence of an oily material reported by the EPA field sampling team along the fence line
sample location.

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URL: http://www.epa.gov/katrina/testresults/sediments/summary.html